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# Kyrgyz Republic Energy Profile

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# Kyrgyz Republic

## Country overview

The Kyrgyz Republic (Kyrgyzstan) is located in Central Asia and is bordered by Kazakhstan to the north, Uzbekistan to the west, Tajikistan to the south and China to the east. The country is approximately 200 000 square kilometres (km<sup>2</sup>) in area, with a population of 6.3 million people. Its plentiful water resources make hydropower the most important energy source; it also has significant deposits of coal, but oil and natural gas resources are marginal.

Kyrgyzstan gained independence in 1991 with the dissolution of the Former Soviet Union, but the country subsequently struggled economically. Later in the 1990s, significant structural market reforms contributed to economic growth, and real gross domestic product (GDP) (adjusted to purchasing power parity [PPP]) increased to around USD 24.54 billion in 2018. Poverty, however, remains around 22.4% (2018).

Agriculture is the largest sector of the economy, its main products being cotton, tobacco, wool and meat. Industrial exports include gold, mercury, agricultural products and electricity ([www.indexmundi.com/kyrgyzstan/economy\\_profile.html](http://www.indexmundi.com/kyrgyzstan/economy_profile.html)). Kyrgyzstan has been a member of the World Trade Organization since 1998, and it joined the Russian Federation (“Russia”), Belarus, Armenia and Kazakhstan in the Eurasian Customs Union in 2015.

The energy sector represents 4% of GDP and 16% of industrial production, and hydropower accounts for two-thirds of energy production. Kyrgyzstan exploits coal and some oil and gas, but most hydrocarbons are imported. In fact, it relies on oil and gas imports for more than half of its energy needs, particularly during the winter months when hydropower production is low. For this reason, regional integration with neighbouring countries is important.

Kyrgyzstan is part of the Central Asian Power System connecting Uzbekistan, Kyrgyzstan, Tajikistan and Kazakhstan. New integration plans include the Central Asia-South Asia power project (CASA-1000), which will connect the electricity-exporting countries of Kyrgyzstan and Tajikistan with Afghanistan and Pakistan to supply them with electricity. The project is in the advanced stages of planning and could be operational after 2023.

Suffering from lack of investment, Kyrgyzstan's energy sector is characterised by aged infrastructure and significant losses. System wear and tear is gauged at over 50%: significant deterioration of energy assets and poor sector development are the result of heavy subsidies, particularly for electricity consumption, which drain resources for system maintenance and investment. Unable to finance the necessary rehabilitation of its natural gas network, Kyrgyzstan sold it to Gazprom for USD 1 in 2013. Gazprom is to invest USD 600 million in the system over a 25-year period.

Current energy policy aims to improve energy security by developing indigenous energy sources (mainly hydro and coal) and rehabilitating and expanding transmission and distribution networks. Developing sustainable energy and improving energy efficiency are also priorities.

Energy sector ties with China have been strengthened in recent years, and China financed several key Kyrgyz development projects. Kyrgyzstan also became a member of the Eurasian Economic Union (EAEU) in 2015.

## Key energy data

- Kyrgyzstan's total primary energy supply (TPES) was 3.9 million tonnes of oil equivalent (Mtoe) in 2015 and reached 4.6 Mtoe in 2018.
- Total final consumption (TFC) totalled 4.2 Mtoe in 2018, and is growing rapidly (+72% since 2008).

## Supply

- In 2018, domestic energy production was 2.3 Mtoe, consisting mostly of hydropower (53%) and coal production (37%). Kyrgyzstan also produces some crude oil and natural gas.
- Domestic production covers roughly half of annual consumption, with imports necessary to meet the remaining demand.
- Coal production has more than quadrupled since 2010, driven by the government's decision to boost coal production in order to decrease dependence on imports, foster decentralised heating supply and minimise the use of electricity for heating purposes by households.

## Imports/exports

- Over 90% of oil products (mainly diesel and motor gasoline) and natural gas are imported. The most important trading partners for oil and gas are the Russian Federation and Kazakhstan.

- Domestic electricity production relies heavily on hydropower (>90%). As a result, seasonal effects (winter peak) and lower water years directly affect the quantities of electricity that must be imported from Tajikistan and Kazakhstan.

## Demand

- In 2018, total final consumption equalled 4.2 Mtoe. Oil is the main energy source (48%) followed by electricity (24%) and coal (17%).
- Residential sector is the largest energy consuming sector in the country, followed by transport and industry.
- Electricity consumption per capita, although sometimes limited by power outages, increased by more than 45% from 2010 to 2018.

## Renewables

- Renewables contribute to 27% (2018) of Kyrgyzstan's energy mix. The calculated share mostly consists of hydroelectricity, but is likely underestimated as data on the consumption of fuelwood and other solid biofuels by households are currently not available.
- Around 90% of total electricity generation is hydro-based. Kyrgyzstan has one of the highest shares of renewable electricity in the world.

## Energy sector governance

From July 2016 the State Committee on Industry, Energy and Subsoil Use (the State Committee) has been in charge of developing and implementing a uniform state policy in the energy sector, including water-energy and fuel resources, renewable energy sources and the industrial potential of the country. In January 2016 the Kyrgyz Government established Open Joint Stock Company "National Energy Holding Company" to manage state-owned shares in the power sector companies.

## Executive

Executive power in Kyrgyzstan lies with the government, its subordinate ministries, state committees, administrative agencies and local administrations. In the energy sector, the government:

- Grants and transfers property rights, and rights for use of water, minerals and other energy resources.
- Provides incentives and promotes a stable and favourable investment climate for the fuel-energy complex.

- Approves the functions and authority of authorised government bodies for the energy sector and licensing.
- Allocates plots of water fund land for temporary use.
- Determines the procedure for holding bids for construction of energy facilities and the criteria for selecting bids and winners.

As the authoritative government body in the energy sector, the State Committee on Industry, Energy and Subsoil Use is responsible for:

- Developing and implementing a uniform state policy for the study and rational use of subsurface resources, water energy and fuel resources, and renewable energy sources, and for assessing the industrial potential of the country.
- Assisting in devising a strategy for effective development of the industry sector, the fuel-energy complex and subsurface resources.
- Participating in developing and implementing interstate programmes and agreements to bolster the country's industrial potential, effective utilisation of water energy and fuel resources, subsurface resources research, and development of mineral resources.
- Developing incentives for energy efficiency, energy saving and use of renewable energy sources.
- Creating conditions for introducing and using renewable energy sources and reliably supplying consumers with energy resources, industrial products and services.

## Legislative

Legislative power is exercised by the parliament (the *Jogorku Kenesh*). Laws may be initiated by: a) a body of 10 000 voters (popular initiative); b) a member of the parliament; or c) the government of the Kyrgyz Republic.

Draft laws submitted to the parliament are deemed accepted if they pass three readings with a majority of deputies' votes. After a law has been accepted by the Parliament, it is sent within 14 days to the president for signing. The president must sign the law no later than one month after receiving it, or return it with objections to the parliament for re-examination. Laws signed by the president are published and come into force ten days from their promulgation if not otherwise stipulated in the law itself or in the law on the procedure for its entry into force.

## Judiciary

The judicial system, consisting of a supreme court and local courts, is established and governed by the constitution and laws of Kyrgyzstan. Judicial power is

exercised through constitutional, civil, criminal, administrative and other forms of proceedings. Specialised courts may be established by law, but the creation of extraordinary courts is prohibited.

The 2010 constitution replaced the Constitutional Court of the Kyrgyz Republic with the Constitutional Chamber in the Supreme Court of the Kyrgyz Republic.

Kyrgyzstan has signed two conventions on international commercial arbitration:

1. The Convention on Settlement of Investment Disputes between States and Nationals of Other States (the ICSID Convention), ratified by the Kyrgyz Republic in July 1997;
2. The Convention on Recognition and Enforcement of Foreign Arbitral Awards (the New York Convention), ratified in May 1995.

## Regulatory framework

The State Agency for Regulation of the Fuel-Energy Sector (the Energy Regulator) is vested with the authority to:

- Issue licenses for energy sector activities.
- Develop tariff-setting methodologies and set tariffs for electricity, heat and natural gas.
- Develop and supervise the reporting and monitoring framework for the performance of energy sector companies.
- Conduct awareness-raising activities.
- Develop procedures for consumers and energy sector companies to lodge claims and complaints.

## Key policies

The National Energy Program for 2008-2010, with its integrated plan for fuel-energy complex development to 2025, remains the main long-term policy document for the energy sector. It aims to:

- Ensure reliable electricity and heat supply.
- Liberalise the electricity market and adopt the legislation necessary to define market rules.
- Improve the energy efficiency of production, transmission and distribution of electricity and heat through modernisation and new technologies.

- Increase hydro and coal-fired generation capacity to augment the national electricity supply and increase exports.
- Actively participate in regional electricity market development within the sphere of the EAEU.

The government prioritises energy security, efficiency and sustainable development in its policies. Improving energy security and efficiency is important due to fluctuations in hydropower production, reliance on hydrocarbon imports, and aged, inefficient infrastructure that incurs high losses.

In March 2020, the government approved a Medium-Term Tariff Policy (MTTP) for 2020-2022 to make electricity, heating and hot water tariffs more cost-reflective while providing affordable energy for the most vulnerable customers.

Kyrgyzstan's energy saving potential is significant: it is estimated that rehabilitation and modernisation can save up to 25% of electricity and 15% of heat. Under the National Strategy for Sustainable Development for 2018-2040, energy efficiency technologies must be applied in all new construction, and the government plans to implement large-scale programmes for the energy-efficient reconstruction of old residential and non-residential buildings, and to introduce energy efficiency passports for all buildings.

The government also prioritises regional electricity market development to improve energy security, intensify market competition and increase exports of Kyrgyz electricity.

The most significant project on regional integration is CASA-1000, consisting of a 500-kilovolt (kV) Datka-Khodjent-Sangtuda alternating current (AC) transmission line connecting Kyrgyzstan and Tajikistan, and a 500-kV direct current (DC) transmission line connecting Tajikistan, Afghanistan and Pakistan. The project was approved in 2012 by all member countries, and in 2019 a subcontractor was selected and construction started. The completion of the Kyrgyz component is planned for 2023.

The government also plans to reform the coal sector by privatising it and increasing competition; it will therefore phase out financial support to the sector to attract private investment. As coal is currently the most cost-effective and readily available fuel, the government plans to increase production in existing fields from 450 kilotonnes (kt) in 2010 to 3 Mt by 2025 (in 2018, coal production was 2.395 Mt). The main objectives of coal sector reform are to:

- Privatisise the coal sector and create a competitive coal market.
- Improve working and safety conditions.

- Improve socio-economic and ecological conditions in coal mining regions.

In the oil and gas sector, policies are directed at improving the fiscal regime of minerals management and attracting investment to develop new oil and gas fields. Further, they aim to foster competition in domestic oil supply with fair conditions for all market participants. Gazprom Kyrgyzstan, in co-operation with Gazprom, is developing a gas distribution policy to 2030.

Kyrgyzstan ratified the Kyoto Protocol in February 2003, and a number of Clean Development Mechanism (CDM) projects have been identified but not yet registered. In October 2013, the government adopted the Priorities for Adaptation to Climate Change up to 2017 programme, aimed at developing adaptation measures in water, agriculture, health, environmental emergencies, forestry and biodiversity; the respective ministries have submitted sectoral adaptation programmes for government approval. Furthermore, Kyrgyzstan's Third National Communication under the United Nations Framework Convention on Climate Change (UNFCCC), prepared by the State Agency for Environment Protection and Forestry, was approved by the Kyrgyz government in October 2016. In November 2019 Kyrgyzstan ratified the Paris Agreement. The State Agency on Environmental Protection and Forestry has developed a first draft of "green economy" document – Concept for Long-term Development of the Kyrgyz Republic with Low Greenhouse Gas Emission until 2050.

## Energy statistics

The National Statistical Committee is responsible for collecting official energy statistics. Energy data are collected through five different surveys sent to enterprises, and annual energy data are published [online](#) in Excel format, following the layout of the fuel energy balance used in the Former Soviet Union. Monthly data on electricity and fossil fuel energy production and trade are also collected. Graphic representations of fossil fuel production are available in the industry statistics section of the National Statistical Committee application.

The National Statistical Committee also disseminates its energy statistics data internationally to the International Energy Agency (IEA) through the joint annual United Nations Economic Commission for Europe (UNECE)/IEA/Eurostat questionnaire. However, Kyrgyzstan does not yet report monthly data to the Joint Organisations Data Initiative (JODI).

The main user of energy data is the State Committee on Industry, Energy and Subsoil Use, which complements the statistics datasets with various other sources

to produce an energy balance. There is no official energy statistics working group in Kyrgyzstan, but in 2017 various ministry and energy company representatives as well as grid operators had the opportunity to meet at the Statistical Committee headquarters in the capacity of a working group on indicators of [water, food and energy security](#) and on UN Sustainable Development Goals.

Kyrgyzstan has achieved great progress in strengthening energy statistics data collection through the INOGATE programme: the National Statistical Committee has submitted joint annual questionnaires to the IEA since 2014, and for 2015 the breakdown of natural gas consumption by sector had improved. Future goals include improved reporting on residential biomass use data, which are currently unavailable, and on small-scale electricity generation.

# Chapter 1. Energy security

## Resource endowment

Kyrgyzstan's oil and gas resources are marginal, but those of coal are substantial. Recoverable oil reserves are estimated at 5 Mt, with 10 Mt of resources, and gas reserves are estimated at 6 billion cubic metres (bcm) and 20 bcm of resources. Explored coal reserves amount to 1.3 billion tonnes (Bt). Kyrgyzstan ranks fifteenth-highest in the world for hard coal resources, but the government estimates that coal reserves are actually larger, at 2 Bt.

Most oil and gas deposits have been exploited for over 70 years and have produced approximately 70% of their economically viable capacity. In addition, newer oil wells dating from 1992 have depreciated by 30%, so between resource depletion and ageing equipment, oil and gas production has declined considerably since the early 1990s. The government therefore plans to exploit new well sites in the future, with potential recognised in the Ferghana Valley, the Alai Valley, the Naryn Basin, the Issyk-Kul basin and the eastern Chuy Basin.

Kyrgyzstan has approximately 70 coal deposits, but as the majority are difficult to exploit, resources are much greater than reserves. Nevertheless, the government plans to increase coal mining considerably, from 450 kt in 2010 to 3 Mt in 2025 (production was 2.395 Mt in 2018). Growth will come from a 30% increase in the existing mines of Kara-Keche, Besh-Burhan, Zhergalan, Sulukta and Tash-Kumyr.

Concerning hydropower, the potential of Kyrgyzstan's rivers is approximately ten times what is currently utilised.

## Energy security and diversification

Kyrgyzstan's energy system is subject to supply security threats as well as other challenges. The network is old and inefficient, and losses are high. In addition, hydro-based electricity production is susceptible to seasonal and weather-related fluctuations: electricity supply is therefore less reliable due to lower water inflows and high demand during the winter months. Furthermore, while demand centres are in the north, more than 80% of hydropower capacity is in the south. Old transmission connections are a further handicap.

Electricity supply is also constrained by the regional water-energy nexus. Kyrgyzstan's major hydropower source, the Toktogul Reservoir, was constructed in Soviet times to provide a more dependable water supply for downstream irrigated agriculture as well as to generate hydropower. After the collapse of the Soviet Union, Central Asian countries began bartering for the exchange of fuel, electricity and water resources, which led to disagreements. Over the past few years Kyrgyzstan has exported electricity to neighbouring countries under bilateral contracts; however such contractual supplies are seasonal and subject to hydrological fluctuations. Volumes of bilateral trade even in high water years do not generate enough funds to procure fuel for winter power generation by combined heat and power plants.

The government's primary focus is on diversifying energy sources and increasing domestic production, mainly for hydropower; in addition, a number of rehabilitation projects for existing thermal power plants are currently being implemented. The reconstruction of the Bishkek TEC-1 plant to increase capacity by an additional 300 megawatts (MW) was carried out in 2017. At present, the reconstruction of heating networks in Bishkek and Osh as well as the reconstruction of substations and improvement of power regulation and water management at the Toktogul Reservoir are also being implemented.

The government has concrete targets, yet their implementation remains a challenge due to the inadequate finances of the energy sector. The unsustainable tariff subsidy regime imposes a significant financial burden, which has resulted in a serious lag in modernisation and expansion of the electricity, heat and gas systems. Growing demand and insufficient investment do not bode well for Kyrgyzstan's energy security.

## Energy infrastructure and investment

### Electricity and heat

Electricity generation capacity in Kyrgyzstan was 3.9 gigawatts (GW) in 2018, from 15 hydropower plants (HPPs) (3 GW) and two co-generation plants (0.812 GW).<sup>1</sup> The electricity transmission network is more than 80 000 km long, including 946 km of 500-kV lines, 2 019 km of 220-kV lines, 4 613 km of 110-kV lines, and roughly 190 transformer substations. About 80% of the

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<sup>1</sup> Co-generation refers to the combined production of heat and power.

hydro capacity is in the south, connected by a 500-kV line to the northern regions that account for 60% of electricity consumption.

Four cities have district heating: Bishkek (85% of households), Osh (35-40%), Kyzyl-Kiya (60%) and Karakol (26%). Electric boilers are the main heat source for the district systems, with approximately 3 000 boilers in operation.

Demand for electricity and heat is increasing, but the systems are aged and inefficient, and investment in rehabilitation and expansion is inadequate.

The Asian Development Bank (ADB) is financing the rehabilitation of the Toktogul Dam: the first phase (USD 55 million) and the second (USD 250 million) are currently being implemented. The second 120-MW unit at Kambarata-2 HPP (360 MW) is also being installed with a USD 138-million loan from the Eurasian Development Bank, and is planned for commissioning in 2021. Another generation facility, At-Bashy HPP, is being rehabilitated with Swiss government support of USD 22.2 million. Construction of the Upper Naryn Cascade (237 MW) started in 2014, but was later suspended, and the planned construction of the Kambarata-1 Plant (1 860 MW) never started, due to the denunciation of the intergovernmental agreement with Russia.

Two new 500-kV substations, Datka and Kemin, were commissioned and the 500-kV Datka-Kemin north-south connecting line was completed in 2015; financing for rehabilitation projects in the transmission subsector comes from the ADB (USD 44.8 million) and the Islamic Development Bank (USD 16.25 million). The electricity distribution network also requires significant investment to decrease losses and improve reliability: several distribution network rehabilitation projects are being implemented with support from the KfW Development Bank (EUR 35 million), the World Bank (USD 25 million) and the Islamic Development Bank (USD 16.25 million).

A 500-kV Datka-Khodjent AC transmission line (200 km) is planned under the CASA-1000 project. The Kyrgyz component of the transmission line will be funded by the World Bank (USD 45 million), the European Investment Bank (EUR 70 million) and the Islamic Development Bank (USD 50 million).

Approved in 2012 by all participating countries, the goal of the CASA-1000 project is a 1 200-km high-voltage power line grid connecting Kyrgyzstan, Tajikistan, Afghanistan and Pakistan. The two exporting countries, Kyrgyzstan and Tajikistan, will generate foreign exchange earnings as they export surplus summer electricity. The project will also connect the power systems of

Kyrgyzstan and Tajikistan, making the high-voltage electricity transmission network in the region more reliable.

## Oil and natural gas

Natural gas is imported via the Bukhara-Tashkent-Bishkek-Almaty pipeline in the north, which transports gas from Uzbekistan to the main Kazakhstan population centres. Annual gas supply to Kyrgyzstan is approximately 300 million cubic metres (mcm) per year.

Gas infrastructure in Kyrgyzstan needs significant refurbishment, as it is over 35 years old and is highly inefficient. The network consists of 709 km of transmission lines, 591 km of average pressure lines, 2 374 km of low-pressure lines, 203 gas distribution points, and 717 control and gas distribution stations.

In December 2013, Kyrgyzstan sold its gas network to Russia's Gazprom for USD 1 in exchange for taking over USD 38 million of debt and pledging to invest USD 600 million to improve Kyrgyzstan's gas network over a 25-year period.

## Coal

The government plans to significantly increase coal mining, from 450 kt in 2010 to 3 Mt by 2025, with a 30% increase from existing mines. During 2018, coal production totalled 2,395 Mt. If production from the Kara-Keche coal mine is increased, it will provide enough coal for the proposed 1.2 GW coal-fired plant, which requires at least 2.5 Mt of coal per year. The Kara-Kechenskaya thermal power plant project has been proposed in order to supply base load power in northern Kyrgyzstan. The government is planning to seek investors for the project through an international bidding process.

## Emergency response

The Electricity Law requires that the government take necessary protective measures, including temporary limitations on the use of electricity, in the event of an emergency or natural disaster and when the physical safety or security of people, installations or system integrity is threatened. Such measures must cause the least possible disruption to electricity sector operations and must not be broader in scope than is strictly necessary to remedy sudden crisis situations. Such limitations shall be approved by Government decree as necessary.

The Rules for Use of Electrical Energy, approved by the government and other normative documents for ensuring the reliability of electricity supply, define three categories of reliability. The State Inspectorate for Ecological and Technical Safety monitors implementation of the Rules.

The first category of reliability concerns installations for which uninterrupted operation is essential for preventing threats to life, threats to national security, significant material damage, suspension of a complex technological process, or damage of essential components of utilities. This highest level of reliability must be provided by the electricity supplier through a secondary backup power source completely independent from the energy system network.

A special group within this highest-reliability category involves electrical installations for which uninterrupted operation is essential for accident-free suspension of production (i.e. to avoid threats to people's lives, explosions, fires and damage to expensive basic equipment). This includes electrical installations for nuclear power stations and life support systems in mines. Uninterrupted energy supply for this special category must be assured by an additional, third independent backup power source separate from the network.

The Rules for Use of Electrical Energy do not obligate energy suppliers to provide customers in the second and third reliability categories with a backup power source, so customers in these categories wishing to have a continuous energy supply in case of power outage or emergency have to install backup generators or power sources (usually diesel generators) at their own expense.

In practice, however, it is common that the infrastructure necessary to ensure backup power is missing and an entire administrative division, having all categories of consumers within it, is fed by one 110-kV transmission line without a second, fully independent backup power source for consumers of the first category. In the rural areas of Kyrgyzstan, many customers are connected to one 10-kV feeder that passes through several population centres, irrespective of the category of electricity supply reliability mandated in the effective normative documents. New and existing customers must therefore install backup generators at their own expense to ensure a continuous power supply to their facilities in case of power outage or emergency.

# Chapter 2. Market design

## National market structure

### Electricity

State-owned KyrgyzEnergo, which owned and operated the electricity and heat production sector, was restructured and unbundled in 2002, spawning seven companies operating in generation, transmission and distribution.

State-owned Joint Stock Company (JSC) Electric Power Plants is the largest electricity generator, and JSC NESK is the state-owned transmission system operator (TSO) that also operates the national dispatch service. The distribution and retail functions of the power sector are still bundled, and distribution system operators (DSOs) are obligated to provide retail services in their territories. There are four electricity DSOs in Kyrgyzstan and one district heating DSO:

- Sever Electro serves Bishkek, Talas and the Chuy region, accounting for 42% of distribution.
- Vostok Electro serves the Issik-Kul and Naryn regions and accounts for 18% of distribution.
- Osh Electro serves the city of Osh and the Osh and Batken regions, and accounts for 26% of distribution.
- Djalal-Abad Electro serves the Djalal-Abad region and accounts for 14% of distribution.
- BishkekTeploSet is the district heating DSO.

All are joint stock companies, owned 83% by the state and 17% by minority shareholders. In January 2016, the Kyrgyz government approved the establishment of Open Joint-Stock Company (OJSC) National Energy Holding Company (NEHC), and the transfer of state shares in these power and heat companies to the charter capital of the NEHC was approved by both Parliament and government. Additionally, state shares in the 100% government-owned companies JSC Chakan GES and JSC Kyrgyz Electricity Settlement Center (established in 2015) were transferred to the NEHC.

Parliament also resolved that none of the NEHC's shares may be sold, pledged or exchanged to repay the country's external debt, and these shares were

transferred to trust management. The property of the NEHC therefore cannot be subject to alienation, including indirect forms.

The Law on Electricity provides for third-party access to the network based on relevant licences issued by the Energy Regulator, but in the absence of relevant secondary legislation there are no third parties operating.

## Oil

OJSC KyrgyzNefteGaz is the sole upstream oil and gas enterprise in Kyrgyzstan. The company also refines oil through its subsidiary Closed Joint-Stock Company (CJSC) Kyrgyz Petroleum in a single refinery in Bishkek.

## Gas

Gazprom is the owner and operator of the gas transmission and distribution system in Kyrgyzstan through its subsidiary Gazprom Kyrgyzstan. Gazprom purchased the network in December 2013 from KyrgyzGaz for USD 1, taking over USD 38 million of debt and pledging USD 600 million worth of investments to improve Kyrgyzstan's gas grid over a period of 25 years. Before December 2013, KyrgyzGaz owned and operated the network, with more than 83% in government ownership.

Amendments to the Law on Oil and Gas in October 2012 allow for third-party access.

## Coal/peat

The coal sector in Kyrgyzstan is managed by KyrgyzKomur, a state-owned enterprise established in 2012 that acts as an umbrella organisation for 23 smaller private coal companies. Seven other companies engage in seasonal coal production during the autumn-winter period.

## Nuclear

None.

## Large hydro

The largest HPPs are Toktogul (1 200 MW), Kurpsai (800 MW), Tashkumyr (450 MW), Shamaldysai (240 MW), Uchkurgan (180 MW), Kambarata-2 (120 MW) and At-Bashy (40 MW).

## Renewable energy

Hydropower is the main source of renewable energy in Kyrgyzstan; the following small HPPs are operating in the Kyrgyz electricity sector: Alamedin Cascade, operated by OJSC Chakan GES (38.5 MW); Kalininskaya, operated by Limited Liability Company (LLC) Kalininskaya GES (1.4 MW); Issyk-Atinskaya, operated by JSC Ark (1.4 MW); Naiman, operated by JSC Naiman GES (0.6 MW); Ak-Suu, operated by Maryam Agricultural Cooperative (0.5 MW); Kyrgyz-Ata, operated by OJSC Satellite-2005 (0.2 MW); and newly commissioned Tegermentinskie, operated by LLC Tegermentinskie GES (3 MW).

## Energy efficiency

There are no companies operating in energy efficiency as of 2019.

## Regulatory framework

In November 2014, the State Agency for Regulation of the Fuel-Energy Sector (the Energy Regulator) was re-established by the government as an autonomous body to ensure independent sector regulation. The Energy Regulator is mandated to undertake economic regulatory functions and perform regulatory oversight in the energy sector, covering electricity, district heating and gas.

Through amendments to key energy sector legislation, tariff reforms were depoliticised in 2014 when the requirement for Parliament to coordinate end-user tariff changes for the power sector was removed. The amendments also created a legal basis for clearly delineated roles and responsibilities in the energy sector, concentrating economic regulatory functions in a single entity, the Energy Regulator. In addition, the government initiated tariff reforms and published a multi-year Midterm Tariff Policy (MTTP) for heating and power envisaging phased and predictable end-user tariff increases for 2014-17.

In line with the MTTP, the Energy Regulator issued orders enacting electricity, district heating and hot water tariff increases for 2014 and 2015; the next tariff

increase was finally introduced and became effective in August 2015. Furthermore, increases in heating and hot water tariffs followed the MTTP's proposals in 2014 and 2015. The goal of the original MTTP was to reach cost recovery by mid-2017, but it was revised several times and the actual tariffs do not match the original MTTP or the revisions. Large consumers and non-residential users are bearing the weight of the tariff increases.

In March 2020 a new MTTP for electricity and heating and hot water tariffs until 2022 was approved by the government. Under the new MTTP, tariffs for the main consumer groups will remain at 2015 levels. No increases to reach the cost-recovery level are planned until 2022. The MTTP introduces new categories of electricity consumers (such as electric transport, children's boarding schools, social institutions for disabled and/or elderly citizens, as well as cryptocurrency companies) and has no plans for tariff increases for these categories.

The heating and hot water tariff for Bishkek will remain at the 2015 level, and tariffs for other end-users are scheduled to reach the cost-recovery level.

**Table 1** Kyrgyzstan electricity tariffs, December 2014 to May 2020, and planned tariffs for 2021-22 (exclusive of tax)

No.	Consumer group	Unit	11 Dec 2014	1 Feb 2015	1 Aug 2015	1 Jan 2017	May 2020	2021	2022
1	Residential, including:								
1.1	Consumption less than 700 kWh per month (excluding the residents of high mountain and remote areas for the period 1 October to 1 May)	tyiyn /kWh	70	70	77	77	77	77	77
	Consumption above 700 kWh per month (excluding the residents of high mountain and remote areas for the period 1 October to 1 May)	tyiyn /kWh	205	182	216	216	216	216	216
1.2	Consumption less than 1 000 kWh per month by high mountain and remote areas residents (1 October to 1 May)	tyiyn /kWh	70	70	77	77	77	77	77
	Consumption above 1 000 kWh per month by high mountain and remote areas residents (1 October to 1 May)	tyiyn /kWh	205	182	216	216	216	216	216
2	Pump stations	tyiyn /kWh	72.8	72.8	77.9	77.9	77.9	77.9	77.9
3	Electric transport						158	158	158

No.	Consumer group	Unit	11 Dec 2014	1 Feb 2015	1 Aug 2015	1 Jan 2017	May 2020	2021	2022
4	Children's boarding schools, social inpatient and semi-stationary institutions for disabled and/or elderly citizens	tyiyn /kWh					158	158	158
5	Budget-funded consumers	tyiyn /kWh	219	197	224	224	224	224	224
6	Agriculture	tyiyn /kWh	219	197	224	224	224	224	224
7	Industry	tyiyn /kWh	219	197	224	224	224	224	224
8	Other consumers	tyiyn /kWh	219	197	224	224	224	224	224
9	Cryptocurrency companies						291	291	291

Note: 1 KG Som = 100 Tyiyn. Exchange rate of the National Bank of the Kyrgyz Republic as of 30 April 2020: UDS 1 = KGS 78.9435.

**Table 2. Kyrgyzstan heat and hot water tariffs, December 2014 to May 2020, and planned tariffs for 2021-22 (exclusive of tax)**

No.	Consumer group	Unit	11 Dec 2014					
			- 31 Mar 2015	1 Apr 2015	1 Jan 2017	2020	2021	2022
<b>1. Heating tariffs</b>								
1.1	Residential	KGS/ Gcal	917.78	1134.76	1134.76	1134.76	1134.76	1134.76
1.2	Industrial	KGS/ Gcal	1557.25	1695.10	1695.10	1695.1	1695.1	1695.1
1.3	Budget- funded consumers	KGS/ Gcal	1557.25	1695.10	1695.10	1695.1	1695.1	1695.1
1.4	Other consumers	KGS/ Gcal	1557.25	1695.10	1695.10	1695.1	1695.1	1695.1
<b>2. Hot water tariffs</b>								
2.1	Residential (for hot water)	KGS/ Gcal	664.96	981.76	981.76	981.76	981.76	981.76
2.2	Residential (hot water - metered consumption)	KGS/ m <sup>3</sup>	48.55	64.38	64.38	64.38	64.38	64.38
2.3	Residential (hot water - consumption norm per 1 person)	KGS/ month	233.03	309.03	309.03	309.03	309.03	309.03
2.4	Other consumers (for hot water)	KGS/ Gcal	1557.25	1695.10	1695.10	1695.1	1695.1	1695.1
2.5	Industrial	KGS/ m <sup>3</sup>	89.59	97.19	97.19	97.19	97.19	97.19
2.6	Budget- funded consumers	KGS/ m <sup>3</sup>	89.59	97.19	97.19	97.19	97.19	97.19
2.7	Other consumers	KGS/ m <sup>3</sup>	89.59	97.19	97.19	97.19	97.19	97.19

Note: Exchange rate of the National Bank of the Kyrgyz Republic as of 30 April 2020: UDS 1 = KGS 78.9435.

## Regional markets and interconnections

Kyrgyzstan's electricity grid is connected to the Central Asian Power System, but since Turkmenistan's disconnection from the grid in 2003 – and even more so since Uzbekistan's disconnection from Tajikistan in 2009 – trade volumes in the system have fallen substantially (Uzbekistan accounted for approximately half of the electricity supplied to the grid). Although trade volumes are much lower, Kyrgyzstan still has cross-border electricity trade with Kazakhstan (export and import), Uzbekistan (export) and Tajikistan (import in small quantities).

Under the framework of the Central Asian Power System, Kyrgyzstan's hydropower system was designed not only to produce electricity, but to provide major ancillary services, frequency regulation and operating reserves for the regional power system. However, these functions are not fully operational due to the lack of agreement among the neighbouring power systems on pricing mechanisms for such services.

As regional integration is one of its major energy policy directions, Kyrgyzstan supports the reinstatement of the Kyrgyzstan-Uzbekistan-Tajikistan-Kazakhstan exchange to improve integration and reduce the use of burdensome and inefficient bilateral contracts. During the winter of 2014-15, Kyrgyzstan imported electricity from Kazakhstan to make up potential shortages resulting from the Toktogul Reservoir's low water level. The 500-kV Datka-Khodjent transmission line planned under the CASA-1000 project would connect Kyrgyzstan with Tajikistan to export power to Afghanistan and Pakistan.

Gas is imported to Kyrgyzstan via the Central Asian Bukhara-Tashkent-Bishkek-Almaty pipeline. Imports through this pipeline satisfy 92% of the country's gas needs. The remaining 8% is covered from the country's own reserves.

In 2012, Kyrgyzstan and China agreed to construct part of the 2 000-km gas pipeline network in Kyrgyzstan. The Central Asia-China pipeline network runs from Turkmenistan to China, and includes Lines A, B and C via Uzbekistan and Kazakhstan (first launched in 2009). In May 2014, Kyrgyzstan approved a feasibility study on its section of Line D. Construction of Kyrgyzstan's share has not yet begun.

# Chapter 3. Sustainable development

## Renewable energy

Kyrgyzstan has considerable untapped renewable energy potential. Existing renewable energy consists of large HPPs, which account for 30% of total energy supply, but only 10% of hydropower potential has been developed. Opportunities to develop decentralised renewable energy technologies are especially promising, primarily small hydropower stations on rivers in the mountains. In 2016, there was approximately 40 MW of small hydro capacity.

Other viable options for renewable energy development in Kyrgyzstan include generating heat from solar energy and biogas, and electricity from wind and solar resources; no projects so far exploit these technologies.

The National Energy Program and the Strategy for Fuel and Energy Sector Development (covering 2010-25) are the key policies for sustainable energy development. The rapid expansion of renewables, especially hydro, is a priority for energy sector development, and the Strategy supports the construction of approximately 100 small hydroelectric plants with total capacity of 180 MW.

## Small hydro

Developing small HPPs is one of the Kyrgyz government's top priorities because it is hoped that increased indigenous energy production will reduce fuel import reliance as well as emissions.

The Law on Renewable Energy adopted at the end of 2008 established an important framework for renewable energy development in general, and for small HPPs in particular. It provides a number of incentives and preferences, such as exemption from customs duties on equipment import and export, relief from licensing for generation, the right to sell output to consumers under commercial

agreements, and guaranteed purchase of renewable energy output by the distribution company. Renewable energy developers also have a multiplying coefficient of 1.3 for the feed-in tariff (for all renewable sources: hydro, wind, solar, biomass and geothermal). The law also guarantees non-discriminatory access of renewable energy output to the grid and obligates the National Grid and distribution companies to ensure unobstructed transit of renewable energy to consumers.

## Solar

Kyrgyzstan's geographic location and climatic conditions are quite favourable for the broader development of solar energy, evident in solar radiation maps. Annual specific power generation by photoelectrical equipment has a potential 300 kilowatt hours per square metre (kWh/m<sup>2</sup>), and annual specific productivity of solar hot water supply could be up to 750 kWh/m<sup>2</sup> (heat). These figures assume the availability of increasingly inexpensive photoelectrical converters, modules and flat solar collectors, as well as the necessary scientific-technical capacity.

## Wind

In Kyrgyzstan's predominantly mountainous terrain, winds of constant direction and strength sufficient for power generation can only be found in remote and sparsely populated areas. Analysis of instrumental observations at meteorological stations reveals that the actual average annual wind speed is much lower than 5 metres per second (m/s) (only at one weather station does it exceed 5 m/s, and that is for two months per year only). As construction of wind power plants is considered feasible from an average annual wind speed of 8 m/s, those areas with average speed of 5 m/s or less are not suitable for wind turbine installation. The potential for wind energy is therefore very low in populated residential areas, and the areas where wind energy could be economically viable are far from consumer centres and difficult to access.

## Geothermal

Kyrgyzstan has more than 30 geothermal sources, but only some of them are used, and then only in sanatoriums and resorts (e.g. Issyk-Ata and Teplye Klyuchi) due to their low capacity. One method of using low-capacity geothermal energy involves collecting scattered low-temperature (5°C to 10°C) natural heat or industrial waste heat through heat pumps for heat supply. However, heat pumps are not widely used in Kyrgyzstan for several reasons, such as low electricity tariffs, lack of consumer knowledge on modern residential heat supply technologies, and a lack of specialised installation companies.

## Biomass

The main barriers to using biomass are its high cost and low conversion efficiency compared with fossil fuels, underdeveloped supply logistics, and risks associated with intensification of agriculture. Biomass capacity includes agriculture (livestock and plants), the food industry and solid domestic waste. Forestry waste, wastewater treatment systems, wood processing and the paper industry are not included because quantities are negligible.

The economic and productive capacity of biomass from livestock, plant material and the food industry relies heavily on the productivity of processing equipment and quantities provided by farms.

## Waste

There are currently no waste-to-energy projects or initiatives. Municipalities of large cities have been considering building plants for converting non-recyclable waste materials into electricity and heat, but no plans have yet been fully developed or implemented.

## Other

None.

## Energy efficiency

Both energy supply and demand offer many opportunities for efficiency improvements in Kyrgyzstan. Infrastructure is aged, worn and highly inefficient with losses above 20%. Residential and commercial building stock was constructed during the Soviet era with few efficiency standards. Energy savings potential in buildings is estimated at a minimum of 15%, while modernisation and rehabilitation in the energy system could yield 25% savings.

The Law on Energy Savings is the main legislation related to energy efficiency. In March 2013, a Law on Energy Conservation and Energy Efficiency in Buildings was adopted, and a State Programme on Energy Saving and Energy Efficiency Policy Planning for 2015-2017 was approved in August 2015.

The State Committee on Industry, Energy and Subsoil Use is tasked with developing incentives for energy efficiency, energy saving and the use of renewable energy sources, as well as creating conditions for introducing and using renewable energy sources and reliably supplying consumers with energy resources, industrial products and services. A department for renewable energy development has therefore been formed within the State Committee.

The State Inspectorate for Ecological and Technical Safety under the Government of the Kyrgyz Republic is responsible for monitoring energy consumption.

Under the National Strategy for Sustainable Development for 2018-2040, energy efficiency technologies must be applied in all new construction and the government plans to implement large-scale programmes on energy-efficient reconstruction of old residential and non-residential buildings, and to introduce energy efficiency passports for all buildings.

## Fuel switching

After Kyrgyzstan gained its independence, residential power consumption rose significantly due to intensive use of electricity for heating and cooking. In November 2014, new electricity tariffs were approved based on a 700-kWh monthly threshold for residential electricity consumers (700 kWh is the level of power consumption that can be satisfied through domestic power generation).

Above this threshold, residential consumers are charged a higher tariff (assessed for domestic power generation) plus the cost of imported power during the winter months. This threshold and the new tariffs provide incentives for consumers to conserve energy, especially in winter, and to adopt alternative fuels when it is economically efficient (coal, for example).

A more reliable supply of gas and implementation of Gazprom Kyrgyzstan's investment programme to improve the gas grid will further encourage switching from electricity to gas and coal.

## Environmental protection

The Law on Environmental Protection, the Law on Ecological Expertise and the Law on Common Technical Regulations to Ensure Environmental Security form the legislative backbone for environmental protection in Kyrgyzstan. They regulate environmental impact assessments and the process of environmental appraisal.

The Electricity Law requires that a study be conducted prior to construction of an HPP to assess the use of water resources for purposes other than electricity generation. The results of that study must be provided to the local authorities of the territory in which the HPP will be constructed or will have effects. Any call for tenders relating to HPPs should contain a memorandum on such a study and its results, and all expenses and losses incurred by the local population as the result of HPP construction should be included in the estimated construction costs.

The Water Law also requires that a state ecological appraisal be conducted prior to construction and commissioning of plants and facilities that may impact water resources and/or the condition of hydro-economic facilities. Financing construction work at water facilities without a state ecological appraisal is prohibited.

Kyrgyzstan's State Agency on Environmental Protection and Forestry is responsible for ecological appraisal and monitoring. A state ecological appraisal must address control over measures on registration of water intake and water releases; protection of water from contamination, impurity and depletion; and prevention of economic activities that may have a harmful influence on the ecological condition of the water facility and the environment.

The Law on Environmental Protection mandates environmental impact assessments are required for all stages of new developments, both for generation facilities and high voltage transmission lines but measures for protecting nature during construction of medium- and low-voltage power lines are almost non-existent.

However, Kyrgyzstan charges a fee for pollution; the methodology for pollution fees was approved by the government in 2011.

In the oil, gas and coal extraction industries, the level of environmental protection is considered low due to insufficient regulation and legislation. Concern is also mounting over the planned increase in coal mining and the sustainability of the sector.

## Climate change

Kyrgyzstan ratified the UNFCCC in 2000 and the Kyoto Protocol in 2003, though it is not an Annex I or Annex II Party and does not have a specific commitment under the Protocol. In line with UNFCCC requirements, Kyrgyzstan prepared three National Communications in 2004, 2008 and 2016. The country's energy-related emissions of carbon dioxide (CO<sub>2</sub>) totalled 9.5 Mt in 2012, 57.6% less than in 1990. The transport sector accounts for 40.9% of energy-related CO<sub>2</sub> emissions, followed by commercial services (including agriculture) at 20.8%, power generation (19.3%), manufacturing (16%), households (2.7%) and other energy industries (0.1%).

In 2013, the document Priority Directions for Adaptation to Climate Change in the Kyrgyz Republic till 2017 was adopted to establish a national resource mobilisation policy and minimise risks to sustainable development. The highest-priority economic sectors requiring adaptation measures were identified as water, agriculture, health, environmental emergencies, forests and biodiversity. Key ministries and agencies prepared sectoral adaptation programmes based on the Priority Directions and including an assessment of the sector's current state, a vulnerability assessment and justification of adaptation measures, and plans including estimated implementation costs. The first sectoral programme (healthcare) was approved in 2011 and others were approved between April and July 2015. In November 2019 Kyrgyzstan ratified the Paris Agreement on climate

change. The State Agency on Environmental Protection and Forestry developed a first draft of the “green economy” document – Concept for Long-term Development of the Kyrgyz Republic with Low Greenhouse Gas Emissions until 2050.

Kyrgyzstan also participates in the Covenant of Mayors programme, an EU initiative to bring together local, regional and national authorities to voluntarily commit to reducing CO<sub>2</sub> emissions by at least 20% by 2020 by improving energy efficiency and introducing renewables. Current Signatories are the mayors of the cities of Osh and Talas, and the mayor of Tokmok is likely to join.

Starting in 2014, the Program for Energy Efficient Modernization of Coal-Fired Small Boiler Houses was approved with the aim of making heat supplied by small coal-fired boilers 34% more efficient by 2020. The programme is expected to be listed with the UNFCCC register of affordable actions by developing countries to reduce greenhouse gas (GHG) emissions.

## Technology research, development and deployment

Technology research and development is almost non-existent in Kyrgyzstan: the main reasons for this are a lack of funding (state funding of research institutes under the National Academy of Science is insufficient) and the country’s small market.

The most recent research by the National Academy of Science includes:

- The development of remote automatic devices for meter reading and data processing by the Institute of Automatics. The project was funded by the state, and the budget reportedly did not exceed KGS 2.5 million (about USD 36.6 thousand at the exchange rate of the National Bank of the Kyrgyz Republic as of 18 April 2017: USD 1 = KGS 68 2881).
- The Institute of Natural Resources’ development of technology for making lignite bricks (reportedly funded by a private Korean company, but the amount is unknown).

In addition, with assistance, knowledge transfer and some limited technology deployment, a handful of local small NGOs implemented several pilot projects in renewable energy development. Replication of such projects is minimal or absent.

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